

EXPERIMENT NO: 1

AIM: Generation of double side band full carrier and detection of AM signal.

APPARATUS: DSB (ST2201) kit, CRO, connecting wires, CRO probes, power supply etc.

THEORY:

AMPLITUDE MODULATION

As the name suggest, the information signal used to control the amplitude of the carrier wave. As the information signal increases in amplitude, the carrier wave is also made to increase in magnitude. Likewise, as the information increases then the carrier amplitude decreases.

DEPTH OF MODULATION

The amount by which the amplitude of the carrier wave increases and a decrease depend on the amplitude of the information signal and is called the depth of modulation. The depth of modulation can be quoted as the fraction or as a percentage

$$\text{Percentage Modulation} = [(V_{\max} - V_{\min}) / (V_{\max} + V_{\min})] * 100 \%$$

DOUBLE SIDEBAND TRANSMITTER

The transmitter circuits produce the amplitude modulated signals which are used to carry information over the transmission to the receiver.

PROCEDURE:-

This experiment investigates the generation of double side band amplitude modulation (AM) wave using the ST2201 module. By removing the carrier from such an AM waveforms, the generation of double side band suppressed carrier (DSBSC) AM is also investigated.

1. Ensure that ^{the} following initial condition exists on the board.
 - a. Audio input select switch should be in INT position.
 - b. Mode switches in DSB position.
 - c. Output amplifier's gain pot in full clockwise position.
 - d. Speakers switch in 'OFF' position.
2. Turn ON power to the ST2201 board.
3. Turn the audio oscillator blocks amplitude pot to its full clock wise (Maximum) position & examine the block's output (TP14) on an oscilloscope.

4. Turn the balance pot, in the balanced modulator & band pass filter circuit block, to its fully clockwise position

5. Monitor, in turn, the 2 inputs to the balanced modulator and band pass filter circuits 1 block at TP1 and TP9

Note that:-

- The signal at TP1 is the audio frequency sine wave from the audio oscillator block. This is the modulating input to our double side band modulator.
- Test point 9 carries a sine wave of 1MHz. Frequency and amplitude 120 m vpp approx. This is the carrier input to our double side band modulator.

6. Next, examine the output of the balanced modulator and band pass filter circuit one block (at TP3), together with the modulating signal at TP1 trigger the oscilloscope on the TP1 signal.

7. To determine the depth of modulation, measure the maximum amplitude (V_{max}) and the minimum amplitude (V_{min}) of the AM waveform at TP3 and use the following formula

$$\% \text{modulation} = [(V_{max} - V_{min}) / (V_{max} + V_{min})] * 100$$

Where,

V_{max} and V_{min} are the max and min amplitude

8. Now, vary the frequency and amplitude of audio frequency sine wave adjusting the amplitude and frequency present in the audio oscillator block. Note the effect that varying each pot has on amplitude of modulated waveform.

OBSERVATION TABLE:

Sr. No	Modulating Voltage (V_m)	Carrier Voltage (V_c)	$M = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$
1			
2			
3			

Result

OBSERVATION TABLE: $f_m =$ ✓
 $f_c =$

; $V_e = 3.0\text{mV}$.

V_m	V_{\max}	V_{\min}	$m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$

